REBATES: THE ENERGY EFFICIENCY MEASURE THAT CAN MAKE A MAJOR DIFFERENCE

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ABSTRACT

Attempts to involve tenants in energy conservation efforts have three principal directions: (a) transfer of the burden of payment from owner to occupants; (b) remote control of space heat by energy management systems or building owners, and (c) financial rewards, i.e., rebates. None of these approaches has achieved noteworthy success. Yet, under the right conditions and when properly administered, rebates can be a most useful cost-effective energy conservation measure.

This paper will argue that the failure of rebates to induce tenants to conserve energy over extended periods of time can be attributed to program design and administration, and that, in contrast to individual metering or remote control of space heat, a system of rebates, combined with energy education and continuous feedback, is not only cost effective, but the most equitable and intelligent approach to tenant involvement in energy conservation efforts in multi-family buildings.

Although the paper discusses rebates from the perspective of colder climates, much of its observations and conclusions are applicable to hot and humid regions as well.

TENANT CONSERVATION STRATEGIES

Everyone recognizes that tenants who are not financially responsible for their heat or utility bills do not have an immediate, clear incentive to conserve energy. There is neither reward for conserving energy, nor penalty for wasting it. They do not know how much of their monthly rent payment is allocated to energy costs, and even if they try to conserve, they do not receive any feedback indicating how effective their efforts are, and, consequently, no reinforcement to continue them.

Building owners and energy companies grappling with this problem have devised numerous techniques intended to instill in tenants of centrally-metered apartment buildings behavior that will conserve energy. These techniques may be divided into three fundamentally different approaches: (a) conversion from master-metered to individually-metered utilities; (b) management or remote control of apartment temperature settings; and (c) check-metering (or submetering as it is sometimes called), which retains master-metered, bulk rate utility prices but gives tenants feedback on each apartment's energy use and provides incentives to conserve.

Non-profit energy companies, with their particular concern for the tenants' physical and economic well-being, have a distinct obligation to give special consideration to this issue in the communities they serve. A review of field experience is helpful.

CONVERSION TO INDIVIDUAL METERS

This approach places full responsibility for energy usage and payments exclusively on the tenants' shoulders. Such conversions, especially in buildings occupied by low-income people, often result in increased hardships, both financial and physical. In buildings where no weatherization improvements have been made, tenants suddenly find themselves responsible for additional payments for which they either have not budgeted, or for which they simply do not have sufficient resources. Even when weatherization measures have been installed, or the property owner has reduced rents to compensate for the tenants' additional financial obligation, renters almost invariably suffer a net loss; the cost of gas or electricity in most states increases markedly when switched from commercial to residential rates, thus more than offsetting the financial savings that should be experienced as a result of reduced usage. Rate differentials vary, of course, from state to state, and even within states between different utilities. Each energy company should make a study of the utilities in the community it serves to determine the precise differences. Generally speaking, non-profit energy programs have found that, in apartments converted to individual meters, tenants use less and pay more.

While conversion from central, bulk-rate meters to individually-metered residential rates is clearly a no-win situation for tenants, it has also been found to be far from the perfect solution to high energy costs for landlords, either. The financial hardship and physical discomfort experienced by tenants in converted apartments engenders resentment toward owners, increases complaints, and contributes to renter turnover; not infrequently, it also results in utility shut-offs, frozen pipes, and building damage, all of which adversely affect the landlord's revenues. Two reports written by Stephan Basler for The Neighborhood Works, a monthly magazine published by the Center for Neighborhood Technology in Chicago, explore this problem in depth. Both illustrate through concrete examples the hardships experienced by landlords and tenants in buildings converted to individually-metered electric heat in that city. The articles also touch on the costs of conversion (from $1,400 to $2,000 per unit), pointing out that if these funds were invested in energy conservation instead, both tenants and landlords would benefit.

But, in spite of these predictable consequences, building owners continue to see con-

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version to individually-metered units as an easy way to divest themselves of the burden of unpredictable energy costs. To counter this tendency toward conversions, and in an effort to protect tenants, the Center for Neighborhood Technology is pressing for passage of an ordinance in Chicago that would require building owners to bring property up to energy-efficiency weatherization standards before they would be permitted to convert.

MANAGEMENT CONTROL

Through the use of a variety of devices, such as locked thermostats, timers, outdoor reset controls, and computerized systems, building owners and managers have attempted to reduce energy usage and costs by simply taking the control of space-heating equipment completely out of the tenants' hands. The reasoning behind this approach is that what tenants can't control, they can't abuse. Further, they must adjust their behavior to the energy management control system, rather than vice versa. If they are cold, they must wear extra clothing, and, regardless of indoor air pollutants or stuffiness, they must keep their windows closed to maintain a reasonable room temperature.

Here, as with the master-meter to individual-meter conversion approach, energy service company experience suggests that energy management control systems in apartment buildings frequently backfire, causing increased hardships and expense to both tenants and landlords. One of the most common examples is the locked thermostat. Tenants quickly learn to deceive the thermometer by draping bags of ice over it. Soon sections of the building then become too warm and windows are opened, even in the coldest weather.

Outdoor reset thermostats and timers are excellent energy savers in single-family homes, where occupant behavior is fairly predictable and the users are willing to experience a little discomfort, because they see and pay the utility bills. But in apartment buildings, where occupant behavior varies from unit to unit, reducing temperatures during the middle of the day or night is extremely annoying to tenants who are ill or elderly or who work nights. Additionally, reset thermostats are not wind-sensitive; therefore, during high winter winds, when cold air infiltration increases dramatically, indoor temperatures tend to fall below acceptable levels, and tenants barrage owners or managers with complaints. Consequently, managers and owners almost inevitably respond by overriding or disconnecting the equipment, rendering it a useless investment.

A variation of this scenario occurs in buildings in which the owner controls the space heat, but not the apartment appliances. In such cases, tenants will supplement space heat by turning on electric or gas ovens and leaving the oven door open, especially when the utility is master-metered and the cost is buried in the rent. This practice defeats the owner's attempt to control energy costs, creates a serious health hazard, and causes accelerated property deterioration. Although there are no records of the number of fires or hospitalizations that have resulted from the use of ovens for space heat, anecdotal information from owners, tenants, and energy service companies suggests the problem is widespread. Tenants who are treated as though they are irresponsible tend to act irresponsibly.

CHECK-METERING

Check-metering, a relatively new technology, emerged out of the convergence of the energy crisis and the computer age. Check-meters are computerized systems that measure energy use at selected points. The first check-meters on the market used a sensing device to measure hot water flow in hydronic systems, thus permitting a multi-family building owner to record the length of time each apartment unit called for heat, and, employing a series of simple mathematical calcualtions, divide the cost of space heating among tenants. Btu meters (which are subject to tenant tampering), and electric current check-meters are more recent evolutions. In all-electric apartment buildings, electric check-metering has many advantages: in addition to measuring demand in each apartment, it is able to monitor usage by building appliances, such as water pumps and elevators, and in common areas. It also detects malfunctioning systems, and can be equipped with load-shedding devices to reduce peak demand.

Encouraging Energy Conservation in Multi-Family Housing: RUBS and Other Methods of Allocating Energy Costs of Residents. A "Cost Allocation Decision Guide," prepared by Lou McClelland for the U.S. Department of Energy, examines check-meter results. It discusses various approaches to submetering, identifies the states in which it is permitted, and lists companies that manufacture different systems. Published in June 1980, this report is somewhat outdated, but still valuable.

Check-meters are prohibited in some states because they are construed as devices for the resale of a public utility by private, unregulated business. However, in those states where they are permitted, their popularity is growing and they are proving to be valuable to both tenants and building owners. To tenants, check-meters provide monthly feedback on their actual energy use, just as utility-installed residential meters do; however, they give the tenants the advantage of lower bulk rates. Check-meters are advantageous to owners, because, in addition to the monitoring capability mentioned above, they are less costly than utility-provided meters to install, and the landlord also enjoys the reduced bulk rate for common area usage.

In 1983, Citizens Conservation Corporation installed a check-metering system in a brick, all-electric, 132-unit elderly highrise in Boston (the Smith House). The installation was part of a comprehensive retrofit package, including air-to-air heat exchangers, an energy efficient water pump, and infill insulation panels under windows. All the building's tenants have meager incomes; their utility and space heating costs are included in their rent, which is subsidized through the federal Section 8 program. At the time of the installation, tenants had no idea

what the building's annual electric bill was ($160,000), nor had they received any instruction in how to conserve energy. In conjunction with the retrofits, CCC established an "energy allowance" for each apartment, taking into consideration floor location and orientation. All units were identical in size. The allowance fluctuated monthly, reflecting heating degree days. Tenants were offered energy conservation tips at seminar-type sessions, and cash rebates as an incentive to save energy. To earn the rebate, tenants need only use fewer kwh than their allowance specified. There is no penalty for using more.

Energy consumption among tenants fluctuated widely. Initially, about a third used less than the allowance specified; a second third ranged in the middle of the scale, generally using a little more than the allowance; the final third's use could only be described as extravagantly wasteful. Gradually, however, the entire building's energy conservation behavior has improved. In the first three months, following installation of the check-metered system, 48 tenants earned rebates totalling $1,000. More energy conservation education sessions were offered, and a CCC staff person visited most of the "wasters." She found that, in many cases, tenants had the dials on their baseboard radiant heaters turned up to the maximum, especially in bathrooms from which air was continuously exhausted, and were reluctant to adjust them down. The reasons for their reluctance were (a) they had great difficulty getting up and down into a kneeling position, which was necessary to manipulate the knobs; (b) they had furniture or clothes hampers in front of them which were difficult to move, or (c) they thought they only worked if they were on full blast. After showing the tenants how to better use their space heat and radiators, and alerting the building's management to the problem, tenant conservation improved steadily. Now, approximately 70 percent of the residents are earning rebates, and, after one year, accumulated more than $10,000 in energy savings.

In the Smith House, CCC had projected a 20.5 percent energy reduction. Actual reduction approaches an annual average of 30 percent. The difference may be attributed to tenant behavior.

The New York State Energy Research and Development Authority sponsored a project to evaluate equipment performance and energy savings in four submetered buildings in New York City, using electricity for lights and appliances only. Building energy consumption was monitored before and after the building's master meter was submetered. Annual energy savings ranged from 17 to 23 percent. The cost of these installations was generally less than half the cost of converting to direct utility metering.

CONCLUSION

Obviously, check-meters will not work in every building. Because of heating system types and configurations, some buildings simply cannot be check-metered. Frequent tenant turnover presents another obstacle to the cash rebate incentive, although it is not a problem when tenants pay their own pro-rated share of the fuel bill. With rebates, tenant education should also be offered and budgeted; CCC charges an annual fee for energy education and fuel use monitoring.

Those non-profit energy programs, tenants associations, and building owners and managers who wish to encourage active renter involvement in energy conservation should carefully consider check-metering. It can be one of the most cost-effective ways to control energy use. Needless to say, a non-profit program or tenants association with renters' interests at heart would not agree to the installation of a check-metering system unless other necessary weatherization and heating system improvements were made, to assure maximum building energy efficiency.

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